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The decline of the world's IQ

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Abstract

Dysgenic fertility means that there is a negative correlation between intelligence and number of children. Its presence during the last century has been demonstrated in several countries. We show here that there is dysgenic fertility in the world population quantified by a correlation of −0.73 between IQ and fertility across nations. It is estimated that the effect of this has been a decline in the world's genotypic IQ of 0.86 IQ points for the years 1950–2000. A further decline of 1.28 IQ points in the world's genotypic IQ is projected for the years 2000–2050. In the period 1950–2000 this decline has been compensated for by a rise in phenotypic intelligence known as the Flynn Effect, but recent studies in four economically developed countries have found that this has now ceased or gone into reverse. It seems probable that this "negative Flynn Effect" will spread to economically developing countries and the whole world will move into a period of declining genotypic and phenotypic intelligence. It is possible that "the new eugenics" of biotechnology may evolve to counteract dysgenic fertility.

Keywords: Intelligence; Decline; Dysgenics; New eugenics; Intelligence, IQ, Dysgenic fertility

1. Introduction

In this paper we seek to answer four questions. These are, first, what is the world's IQ? Second, is the world's IQ declining? Third, if the world's IQ is declining, what is the rate of this decline? And fourth, what is the likely future of the world's IQ? These questions are difficult to answer, but we believe that the probability that the world's IQ is declining is a sufficiently important issue to be worth tackling.

The possibility that the intelligence of the population of Britain and other economically developed nations is declining was raised by Galton (1869) and was a cause of widespread concern in the first half of the twentieth century. The decline of intelligence was first inferred from the negative association between intelligence and number of siblings, shown by Lentz (1927) in the United States and by Cattell (1937) and Burt (1952) in Britain, from which it was inferred that more intelligent couples were having fewer children than the less intelligent. This inference was later confirmed by a number of studies reviewed in Lynn (1996). For instance, Herrnstein and Murray (1994) showed that in the United States women with an average IQ of 111 had 1.6 children, while women with an average IQ of 81 had 2.6 children.

The negative association between IQ and number of children became known as dysgenic fertility. Since it was assumed that intelligence is to some degree inherited, it became widely believed that dysgenic fertility entailed a decline in the intelligence of the

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population. Calculations of the rate of decline were made by Lentz (1927), Cattell (1937) and Burt (1952). Empirical studies were carried out to examine whether intelligence was in fact declining but these showed that, contrary to expectation, intelligence was increasing. This was reported in the United States by Tuddenham (1948), in Scotland by the Scottish Council for Research in Education (1949), and in England by Cattell (1950). These increases in intelligence subsequently became known as the Flynn Effect because of the extensive work confirming them by Flynn (1984, 1987).

These studies showing that intelligence has been increasing, contrary to the expectation that it should be declining, led to a rethink on the problem. The solution was found by Retherford and Sewell (1988) and lies in the distinction between phenotypic and genotypic intelligence. Phenotypic intelligence is measured intelligence and it is this that has been increasing. Genotypic intelligence is the genetic component of intelligence and it is this that has been declining.

Retherford and Sewell (1988) presented an estimate of the magnitude of the decline of genotypic intelligence in the United States. They used the formula for calculating the magnitude of the genotypic change (decline or increase) of a trait resulting from differential fertility worked out by population geneticists and applied it to the decline of genotypic intelligence. This formula is given by Plomin, DeFries and McClearn (1990, p. 281) as $R=h^2S$, where R is the response to selection (i.e. the change in genotypic value resulting from differential fertility), h^2 is the narrow heritability of the trait (i.e. the heritability attributable to additive genes, whereas broad heritability includes the effects of dominants and recessives), and S is the selection differential (the difference between the parental and the child generations (for a further explanation of this, see Plomin et al. (1990, p. 280 ff). Retherford and Sewell (1988) calculated the IQ difference between the parental and the child generations by assuming that children have on average the same IQ as their parents, and weighting the IQs of the child generation by their proportions in the child population. This gives the selection differential, which in their data set was −0.81 (i.e. the mean IQ of the child generation was 0.81 IQ points lower than that of the parental generation). Adopting the narrow heritability of intelligence of 0.71 given by Jinks and Fulker (1970), there is therefore a decline of genotypic intelligence of 0.57 IQ points a generation ($0.81\times0.71=0.57$). About the same magnitude of dysgenic fertility has been found in several other economically developed nations, reviewed in Lynn (1996).

2. Estimating the decline of the world's genotypic IQ

Here we use the formula given above for calculating the decline of the genotypic value of a trait ($R=h^2S$) and used by Retherford and Sewell (1988) to calculate the decline of genotypic intelligence in the United States, to examine the question of whether the genotypic intelligence of the world has been declining. To do this we need first to obtain estimates of the world's IQ for two successive generations to calculate the selection differential. To obtain this we have estimated the world's IQ in 1950 and in 2000. To calculate the world's IQ in 1950 we have used the IQs for all the 192 nations in the world given by Lynn and Vanhanen (2002) and weighted these by the size of the populations given by the U.S. Bureau of the Census (2006). These data are given in the appendix.

These calculations assume that national IQs were the same in 1950 and 2000. This assumption is justified by the demonstration that there is a correlation of 0.92 between two measures of national IQs obtained at different times, based on 71 countries (Lynn & Vanhanen, 2002, p. 62). This assumption can be questioned on the grounds that the immigration into the United States, Canada and Europe of non-European peoples with lower average IQs than the indigenous peoples is likely to reduce the national IQs of these countries. We accept that this is likely the case but believe that the effect is too small to have any significant effect on our calculations.

These calculations give the IQ of the world in 1950 as 92.75. Applying the same method to calculate the world's IQ in 2000, we obtain an IQ of 90.31 (note that these figures are "notional IQs", i.e. the IQs that would be present if environmental conditions for the development of intelligence had been the same in 1950 and 2000). Thus, there has been a decline of 2.44 "notional IQ" points in the world's IQ from 1950 to 2000. This 50 year period represents approximately two generations, so the decline per generation is half this figure = 1.22 "notional IQ" points for one generation (notice that this is a little greater than the decline of 0.81 "notional IQ" points a generation in the United States calculated by Retherford and Sewell). This is the selection differential for intelligence in the world. The principal reason for the decline in "notional IQ" lies in the negative correlation coefficient of −0.73 across nations between IQ and fertility (Total Fertility Rates are given by the CIA World Factbook, 2006).

To calculate the decline of the world's genotypic intelligence, we also need to know the narrow heritability of intelligence in the world. This is more difficult to estimate. Heritability is a population statistic and the heritability of intelligence may be expected to vary in different populations. In fact, however, the narrow heritability of

intelligence has been found to approximately be the same (about 0.70) in a number of economically developed nations and in India reported in two studies (Nathawat & Puri, 1995; Pal, Shyam & Singh, 1997). The magnitude of heritability depends on the variability in environmental conditions in the population and is therefore likely to be lower for the whole world because the variability in environmental conditions is greater across the whole world than in individual nations. We propose as a reasonable assumption that the world heritability of intelligence is half that of the heritability within economically developed and economically developing nations, i.e. about 0.35. Adopting this figure, the decline of the world's genotypic IQ over the period 1950–2000 is estimated at $2.44 \times 0.35 = 0.86$ IQ points. A generation is typically around 25 years, so this represents a decline of the world's genotypic IQ of 0.43 IQ points a generation. The world heritability of intelligence of 0.35 is a "guesstimate". If we assume a higher heritability of 0.50, the decline of the world's genotypic IQ would be of 0.61 IQ points a generation. Alternatively, if we assume a lower heritability of 0.15, the decline of the world's genotypic IQ would be of 0.183 IQ points a generation.

3. Estimating the future decline of the world's genotypic IQ

It is possible to estimate the future rate of decline of the world's genotypic IQ for the period 2000–2050 by using the US Bureau of the Census estimates of the populations of all nations for the year 2050. These estimates are based on reasonable assumptions about fertility and mortality in different countries, including increasing rates of mortality from AIDS in sub-Saharan Africa. Using the same method as for the calculation of the world's IQ in 1950 and 2000, we calculate that the world's IQ in 2050 will be 86.67. We recall that in the year 2000 the world IQ was 90.31, so we estimate a decline of 3.64 "notional IQ" points by the year 2050. Assuming a narrow heritability of intelligence for the world of.35, the decline of genotypic IQ in the world over this 50 year period is estimated at $3.64 \times 0.35 = 1.27$ IQ points. Assuming as before that this 50 year period comprises approximately two generations, this represents a decline of half this figure = 0.64 IQ points per generation. Notice that this is not greatly different from the decline of 0.57 IQ points a generation for the United States on the basis of Retherford and Sewell's data).

It will be noted that this predicted decline of the world's genotypic IQ during the years 2000–2050 is 50% greater than that for the years 1950–2000. The main reason for this is that total fertility rates are projected by the US Bureau of the Census to be lower in high IQ countries during 2000–2050 than between the years 1950–2000.

4. The decline of genotypic IQ within countries

The negative association between IQ and fertility across nations is not the only factor responsible for a decline in the world's genotypic intelligence. An additional factor is dysgenic fertility within countries. As noted in Section 1, the Retherford and Sewell (1988) study indicated a decline of genotypic intelligence in the United States of 0.57 IQ points a generation. About the same magnitude of dysgenic fertility has been found in several other economically developed nations, reviewed in Lynn (1996).

Much less is known about whether dysgenic fertility is present in economically developing countries. The only work known to us is that of Meisenberg, Lawless, Lambert and Newton (2005) and is a study of the Afro-Caribbean population of Dominica. In this study of 352 people aged 51–62 it was found that for men the association between intelligence measured by the Progressive Matrices and number of children was slightly positive for men ($r = 0.06$), but negative for women ($r = -0.163$). The greater dysgenic fertility for women than for men has typically been found in economically developed countries. If we combine the results for men and women, the correlation between intelligence and fertility in Dominica is −0.08 and is therefore slightly dysgenic. It is not possible to estimate the magnitude of the decline of genotypic intelligence from the data. All that can be inferred from this study is that dysgenic fertility is present in Dominica and this may or may not be typical of other economically developing countries. If it is, dysgenic fertility within countries is a likely a worldwide phenomenon and is increasing the magnitude of the decline of the world's genotypic intelligence estimated in Sections 2 and 3.

5. The rise and fall of the world's phenotypic intelligence

While the evidence suggests that the world's genotypic IQ has declined over the period 1950–2000, and can be projected to decline more strongly over the period 2000–2050, there is much evidence to indicate that the world's phenotypic IQ increased over the period 1950–2000, and may (or may not) continue to increase over the period 2000–2050. This increase over the period 1950–2000 that has become known as the Flynn Effect, is attributable to improvements in the environment for the development of intelligence. There is no consensus as to what these improvements in the environment consist of, but suggestions have included improvements in nutrition, education,

and a more cognitively stimulating environment. The magnitude of the Flynn Effect among school age children is about 3 IQ points a decade, and somewhat higher at around 5 IQ points a decade among military conscripts where later generations have had more years of education than earlier generations.

There is considerable evidence for the Flynn Effect in a number of economically developed countries (Flynn, 1984, 1987). There is much less evidence on whether similar increases in intelligence have been taking place in economically developing countries, but there is sufficient evidence to suggest that IQ increases of broadly similar magnitude have been taking place in these. For instance, in the 16 studies of the IQs of blacks in South Africa that span the years from 1929 to 2004, summarized in Lynn (2001, pp. 31–4), the IQ of 65 reported in the first study published in 1929 was barely different from the IQ of 67 in the most recent study published in 2004. This indicates that the IQ of blacks in South Africa has been increasing at just about the same rate as that of IQs in Britain, against which the IQs in South Africa have been calibrated. A Flynn Effect has been reported in Kenya (Daley et al., 2003) and in Dominica, where a gain of 18 IQ points among the adult Afro-Caribbean population has been found over 35 years, measured by the Progressive Matrices and representing an increase of 5.1 IQ points a decade (Meisenberg et al., 2005). This rate of gain is comparable to the increases among adults in economically developed nations reported by Flynn (1987).

These IQ gains of around 3 IQ points a decade (about 7.5 IQ points a generation) among school age children and 5 IQ points among adults are clearly much greater than the loss of around 0.43 IQ points a generation in the world's genotypic IQ that we have estimated for the period 1950–2000, plus a further loss arising from dysgenic fertility within countries that is unquantifiable. Thus, the situation for the world's IQ appears to be similar to that in the United States and other economically developed countries in so far as the genotypic IQ has been declining, but the phenotypic IQ has been increasing at a greater rate as a result of environmental improvements.

6. The future of the world's intelligence

We have suggested that over the period 1950–2000 the increase of the world's phenotypic IQ has more than compensated for the decline of the world's genotypic IQ, just as it has in a number of individual countries. However, this compensation cannot be expected to continue indefinitely. On the contrary, the environmental improvements responsible for the Flynn Effect are likely to be subject to diminishing returns. When their impact is exhausted, and if dysgenic fertility continues, phenotypic intelligence will begin to decline.

There is some evidence from four recent studies that the expectation that the Flynn Effect will peter out and then be superseded by a decline in phenotypic intelligence has already occurred. These are, first, a study of the intelligence of conscripts in Norway over 50 years has reported that there were the usual gains up to the mid-1990s, but from then until 2002 there has been no increase (Sundet, Barlaug & Torjussen, 2004). Second, in Australia the IQ of 6–11 year olds measured by the Colored Progressive Matrices has shown no increase from 1975–2003 (Cotton et al., 2005). Third, in Denmark where the IQs of all young men aged 18–19 conscripted for military service has been recorded since 1959, it has been found that between 1959–1989 the mean IQ of the conscripts increased by 3 IQ points per decade, confirming many other studies (Teasdale and Owen, 2005). However, from 1989–1998 the mean IQ of the conscripts increased by only 1.6 IQ points, showing a slowing of the rate of increase. The IQ peaked in 1998, and from this year to 2004 the mean IQ of the conscripts declined by 1.6 IQ points, representing 2.7 IQ points per decade. Thus, phenotypic intelligence in Denmark has begun to decline at just about the same rate as its previous rate of increase.

Fourth, in Britain a decline in IQ among 11–12 year olds of 12 IQ points over the years 1975–2003, representing a decline of 4.3 IQ points a decade, has been reported by Shayer (2007). The evidence of these four studies suggests that the Flynn Effect has ceased in the economically developed nations. There is, however, a problem with these four studies that these countries have significant numbers of non-European immigrants whose mean IQs are lower than the indigenous populations and these will reduce the mean IQs of recent samples. The contribution of this to the "negative Flynn Effect" needs to be quantified.

Nevertheless, it seems probable that in the economically developed nations the phenotypic intelligence will first stabilize, as it apparently has in Norway and Australia, and then decline, as it apparently has in Denmark and Britain. In the economically developing nations phenotypic intelligence will likely increase for some years if environmental conditions improve. This will reduce the intelligence gap between the economically developed and the economically developing nations, but it must be expected that in due course the impact of environmental improvements in the economically developing nations will cease. When this happens, and if dysgenic fertility continues, it can be predicted that both genotypic and phenotypic intelligence will decline throughout the world.

The decline of the world's intelligence and the prospect of a continuation of this decline must surely be a cause for

concern. Intelligence is an important determinant of scientific and cultural achievement, earnings, health and many aspects of the quality of life. All of these are likely to deteriorate as the world's intelligence declines.

We should consider whether there are any plausible alternative scenarios to the projected decline of the world's intelligence. The problem lies in the presence of dysgenic fertility worldwide and in whether this could be reversed or is likely to reverse itself spontaneously. The problem of arresting and if possible reversing dysgenic fertility within countries was extensively discussed by eugenicists in the first half of the twentieth century. Accounts of these ideas have been given by Kevles (1985) and Lynn (1996, 2001). The eugenicists considered a twofold strategy to deal with the problem, which they designated positive and negative eugenics. Positive eugenics consisted of policies designed to persuade the more intelligent to have greater numbers of children. The principal method proposed was the provision of financial incentives, as advocated by Cattell (1937), but it proved impossible in the western democracies to introduce any practical measures of this kind. Negative eugenics consisted of the dissemination of knowledge of birth control and the sterilisation of the mentally retarded, which was first introduced in Indiana in 1907 and subsequently in most of the American states and throughout most of Europe. These programs had some success but did not arrest dysgenic fertility (Lynn & van Court, 2004).

In the second half of the twentieth century, public opinion turned against eugenics and from the 1960s onwards eugenics became virtually universally condemned. Throughout western nations the eugenics societies for the promotion of eugenics dissolved themselves. It seems unlikely that any attempts to introduce eugenic programs in the western democracies will be made in the foreseeable future. The lesson to be drawn from the history of the eugenics movement is that it would be immensely difficult and probably impossible to halt or reverse dysgenic fertility by the methods of classical eugenics. The eugenicists tried to find ways of reversing dysgenic fertility in individual countries and failed. It would be even more difficult to reverse dysgenic fertility in the whole world. To achieve this ways would have to be found to increase fertility in the high IQ nations and reduce fertility in the low IQ nations. We do not see any probability of success in achieving either of these objectives.

It remains possible that "the new eugenics" of biotechnology may evolve to counteract dysgenic fertility. The most promising development would be embryo selection. This would entail the culture of a number of embryos by IVF, the genetic screening of them for intelligence (as well as other desirable qualities), and the implantation of those with the genetic potential to develop high intelligence. A futuristic scenario of this kind has been envisioned by Silver (1996). This technique is already being used to screen out embryos with the genes for genetic disorders and to implant those free of these disorders. It is not yet possible to use this technique to identify and implant embryos with high potential intelligence but it is likely that this will become possible in the future. Any attempt to do this is at present prohibited in the United States, Canada and Europe, but once the technique has become feasible it is likely that it will be permitted in some countries and couples will go to these for the treatment.

If this happens it could have a considerable effect in raising intelligence. Most couples have some alleles for high intelligence and are capable of producing children with higher intelligence than they have themselves. This technology would allow them to do so. It is likely that this technique would be used first by more intelligent and affluent couples in economically developed nations and come in time to be adopted by most of the population. This would raise intelligence in the economically developed nations and increase further the intelligence gap between the economically developed high IQ nations and the economically developing low IQ nations. Eventually it might spread to the economically developing nations.

This scenario posits that eugenic fertility may evolve spontaneously in free societies through the exercise of individual choice by couples. An alternative scenario is that the rulers of some authoritarian state will recognise the dangers of dysgenic fertility and declining intelligence and impose measures to reverse it. The most likely of these would be the requirement of licences for parenthood that would only be granted to couples with some minimum level of intelligence. Since the intelligence of parents is correlated with that of their children at around 0.5, a licensing scheme of this kind would increase the intelligence of the child generation. A scheme of this kind was proposed by Galton in an unpublished blueprint for his eugenic Utopia, an account of which is given in Lynn (2001). The Chinese came close to implementing a program of this sort in the 1980s in the one-child policy, in which couples were required to obtain a certificate to have a child and were punished by fines and other penalties for having unauthorized children (White, 2006).

Through these, or perhaps by other means, the dysgenic fertility of the twentieth and early twenty-first centuries could turn out to be only a temporary phase in the world's demographic development and the decline of the world's intelligence will be averted.

Appendix

	Country	Fertility rates	IQ	Population 1950	Population 2000	Population 2050
1	Afghanistan	6.69	84	8,150,368	23,898,198	81,933,479
2	Albania	2.03	90	1,227,156	3,473,835	4,016,945
3	Algeria	1.89	83	8,892,718	30,409,300	43,983,870
4	Andorra	1.30	98	6176	66,824	69,129
5	Angola	6.35	68	4,117,617	10,377,267	24,746,652
6	Antigua & Barbuda	2.24	70	45,816	66,464	69,259
7	Argentina	2.16	93	17,150,336	37,497,728	48,740,060
8	Armenia	1.33	94	1,355,269	3,042,556	2,943,441
9	Australia	1.76	98	8,267,337	19,164,620	24,175,783
10	Austria	1.36	100	6,935,100	8,113,413	7,520,950
11	Azerbaijan	2.46	87	2,885,332	7,809,052	9,955,428
12	Bahamas	2.18	84	70,498	290,075	324,052
13	Bahrain	2.60	83	114,840	634,137	973,412
14	Bangladesh	3.11	82	45,645,964	130,406,594	279,955,405
15	Barbados	1.65	80	210,666	273,483	274,523
16	Belarus	1.43	97	7,722,155	1,033,697	7,738,613
17	Belgium	1.64	99	8,639,369	10,263,618	9,882,599
18	Belize	3.60	84	65,797	247,887	541,734
19	Benin	5.20	70	1,672,661	6,627,964	16,356,458
20	Bermuda	1.89	90	38,869	62,971	66,025
21	Bhutan	4.74	80	734,000	2,005,222	4,653,000
22	Bolivia	2.85	87	2,766,028	815,260	13,772,819
23	Bosnia & Herzegovina	1.22	90	2,662,000	4,035,457	3,891,669
24	Botswana	2.79	70	430,413	1,607,069	1,411,662
25	Brazil	1.91	87	53,443,075	175,552,771	228,426,737
26	Brunei	2.28	91	44,983	336,376	600,998
27	Bulgaria	1.38	93	7,250,500	7,818,495	4651,477
28	Burkina Faso	6.47	68	4,376,162	11,308,552	43,656,786
29	Burundi	6.55	69	2,362,522	6,621,166	22,852,556
30	Cambodia	3.37	91	4,471,170	12,466,262	25,089,909
31	Cameroon	4.39	64	4,887,591	15,343,036	34,908,839
32	Canada	1.61	99	14,011,422	31,278,097	41,429,579
33	Cape Verde	3.38	76	146,403	401,343	380,614
34	Central African Rep.	4.41	64	1,259,816	3,935,417	6,502,151
35	Chad	6.25	68	2,607,769	8,316,481	29,547,665
35	Chile	2.00	90	6,090,833	15,153,450	19,244,843
37	China	1.73	105	562,579,779	1,268,853,362	1,424,161,948
38	Colombia	2.54	84	11,591,658	39,685,655	64,534,420
39	Comoros	5.03	77	148,057	578,400	1,835,099
40	Congo: Dem Rep of (Zaire)	6.45	65	13,568,762	52,021,832	183,177,415
41	Congo: Rep of (Brazz)	6.07	64	826,308	3,102,404	9,618,358
42	Cook Islands	3.10	89	14,575	20,407	24,930
43	Costa Rica	2.24	89	866,982	3,710,558	5,696,700
44	Cote d'Ivoire	4.50	69	2,860,288	15,563,387	32,400,664
45	Croatia	1.40	90	3,837,297	4,410,830	3,864,201
46	Cuba	1.66	85	5,784,797	11,134,273	10,477,677
47	Cyprus	1.82	91	494,000	758,363	841,102
48	Czech Republic	1.21	98	8,925,122	10,270,128	8,540,221
49	Denmark	1.74	98	4,271,000	5,337,416	5,575,147
50	Djibouti	5.31	68	60,036	430,822	993,011
51	Dominica	1.94	67	51,423	71,540	81,961
52	Dominican Republic	2.83	82	2,352,968	8,410,393	146,579,62
53	Ecuador	2.68	88	3,369,955	12,505,204	20,332,088
54	Egypt	2.83	81	2,119,7691	70,492,342	126,920,512
55	El Salvador	3.12	80	1,939,800	6,122,515	12,039,149
56	Equatorial Guinea	4.55	64	211,204	473,216	1,063,071

(continued on next page)

Appendix (*continued*)

	Country	Fertility rates	IQ	Population 1950	Population 2000	Population 2050
57	Eritrea	5.08	68	1,403,000	4,356,581	10,164,000
58	Estonia	1.40	99	1,095,610	1,379,835	861,913
59	Ethiopia	5.22	64	20,174,562	64,690,052	144,716,331
60	Fiji	2.73	85	287,348	832,494	1,447,573
61	Finland	1.73	99	4,008,900	5,168,595	4,819,615
62	France	1.84	98	41,828,673	59,381,628	61,017,122
63	Gabon	4.74	64	415,767	1,235,484	3,221,749
64	Gambia	5.30	66	271,369	1,367,884	4,068,861
65	Georgia	1.42	94	3,515,602	4,777,209	3,784,724
66	Germany	1.39	99	68,374,572	82,187,909	73,607,121
67	Ghana	3.99	71	5,297,454	19,736,036	38,735,638
68	Greece	1.34	92	7,566,028	10,559,110	10,035,935
69	Grenada	2.34	71	75,806	89,312	87,136
70	Guatemala	3.82	79	2,968,976	11,085,025	22,995,434
71	Guinea	5.79	67	2,585,509	8,638,858	28,713,509
72	Guinea-Bissau	4.86	67	573,268	1,278,273	2,895,666
73	Guyana	2.04	87	427,971	755,171	597,806
74	Haiti	4.94	67	3,097,220	7,443,620	19,807,275
75	Honduras	3.59	81	1,431,447	6,347,658	12,641,869
76	Hong Kong	0.95	108	2,237,000	6,658,720	6,172,725
77	Hungary	1.32	98	9,338,000	10,137,449	8,374,619
78	Iceland	1.92	101	142,938	281,043	350,922
79	India	2.73	82	369,880,000	1,004,124,224	1,807,878,574
80	Indonesia	2.40	87	82,978,392	213,829,469	313,020,847
81	Iran	1.80	84	16,357,000	63,273,255	81,490,039
82	Iraq	4.18	87	5,163,443	22,675,617	56,360,779
83	Ireland	1.86	92	2,963,018	3,791,690	5,396,215
84	Israel	2.41	95	1,286,131	5,842,454	8,516,835
85	Italy	1.28	102	47,105,000	57,719,337	50,389,841
86	Jamaica	2.41	71	1,384,550	2,615,447	3,499,068
87	Japan	1.40	105	83,805,000	126,699,784	99,886,568
88	Jordan	2.63	84	561,254	4,998,564	11,772,789
89	Kazakhstan	1.89	94	6,693,230	15,032,140	15,099,700
90	Kenya	4.91	72	6,121,184	30,507,979	65,175,864
91	Kiribati	4.16	85	33,448	91,985	235,342
92	Kuwait	2.91	86	144,774	1,973,572	6,374,800
93	Kyrgyzstan	2.69	90	1,738,961	4,851,054	8,237,623
94	Laos	4.68	89	1,885,984	5,497,733	13,176,153
95	Latvia	1.27	98	1,936,498	2,376,178	1,544,073
96	Lebanon	1.90	82	1,364,030	3,578,036	4,940,731
97	Lesotho	3.28	67	726,182	2,037,961	1,448,643
98	Liberia	6.02	67	823,885	2,693,780	7,072,402
99	Libya	3.28	83	961,305	5,115,450	10,817,176
100	Lithuania	1.20	91	2,553,159	3,654,387	2,787,516
101	Luxembourg	1.78	100	295,587	438,777	720,603
102	Macedonia	1.57	91	1,224,627	2,014,512	1,990,728
103	Madagascar	5.62	82	4,620,437	15,741,942	56,513,827
104	Malawi	5.92	69	2,816,600	11,559,538	29,820,957
105	Malaysia	3.04	92	6,433,799	21,793,293	43,122,397
106	Maldives	4.90	81	79,293	301,475	815,031
107	Mali	7.42	69	3,687,654	10,048,561	40,002,414
108	Malta	1.50	97	311,973	389,947	395,639
109	Marshall Islands	3.85	84	10,904	53,064	102,761
110	Mauritania	5.86	76	1,005,595	2,667,859	8,635,801
111	Mauritius	1.95	89	481,270	1,179,368	1,451,156
112	Mexico	2.42	88	28,485,180	99,926,620	147,907,650
113	Micronesia	3.16	84	30,715	107,754	74,296
114	Moldova	1.85	96	2,336,432	4,382,462	3,620,416
115	Mongolia	2.25	101	778,555	2,600,835	4,086,025

Appendix (*continued*)

	Country	Fertility rates	IQ	Population 1950	Population 2000	Population 2050
116	Morocco	2.68	84	9,343,384	30,122,350	50,871,553
117	Mozambique	4.62	64	6,250,443	18,124,564	41,842,274
118	Myanmar (Burma)	1.98	87	19,488,000	44,301,206	54,430,000
119	Namibia	3.06	70	463,729	1,905,659	1,795,852
120	Nepal	4.10	78	8,989,915	24,702,119	53,293,874
121	Netherlands	1.66	100	10,113,527	15,907,853	17,334,090
122	New Caledonia	2.28	85	55,069	201,816	290,682
123	New Zealand	1.79	99	1,908,310	3,819,762	48,42,397
124	Nicaragua	2.75	81	1,097,916	4,932,420	9,437,504
125	Niger	7.46	69	3,271,073	10,516,111	34,419,502
126	Nigeria	5.49	69	31,796,939	114,306,700	356,523,597
127	North Korea	2.10	106	9,471,140	21,647,682	26,363,688
128	Northern Mariana Isles	1.24	81	6,286	69,706	143,132
129	Norway	1.78	100	3,265,126	4,492,400	4,966,385
130	Oman	5.77	83	488,588	2,533,389	8,237,623
131	Pakistan	4.00	84	39,448,232	146,342,958	294,995,104
132	Panama	2.68	84	892,502	2,889,485	5,038,122
133	Papua New Guinea	3.88	83	1,412,466	4,926,984	10,670,394
134	Paraguay	3.89	84	1,475,669	5,585,828	14,635,743
135	Peru	2.51	85	7,632,500	25,979,722	38,300,067
136	Philippines	3.11	86	21,131,264	79,739,825	147,630,852
137	Poland	1.25	99	24,824,000	38,654,164	32,084,570
138	Portugal	1.47	95	8,442,750	10,335,597	9,933,334
139	Puerto Rico	1.75	84	2,218,000	3,815,909	3,770,496
140	Qatar	2.81	78	25,101	744,483	1,239,216
141	Romania	1.37	94	16,311,000	22,451,921	18,678,226
142	Russia	1.28	97	101,936,816	146,709,971	109,187,353
143	Rwanda	5.43	70	2,439,435	8,278,209	25,089,909
144	Samoa	2.94	88	81,858	179,466	170,739
145	Sao Tome & Principe	5.62	67	59,730	159,883	502,489
146	Saudi Arabia	4.00	84	3,859,801	23,153,090	49,706,851
147	Senegal	4.38	66	2,653,637	10,332,013	27,519,852
148	Serbia	1.78	89	6,710,261	10,117,908	9,274,767
149	Seychelles	1.74	86	32,903	79,326	89,713
150	Sierra Leone	6.08	64	2,087,055	4,808,817	13,998,936
151	Singapore	1.06	108	1,022,100	4,036,753	4,635,110
152	Slovakia	1.33	96	3,463,446	5,400,320	4,943,616
153	Slovenia	1.25	96	1,467,759	2,010,057	1,596,947
154	Solomon Islands	3.91	84	106,647	466,194	1,110,514
155	Somalia	6.76	68	2,437,932	7,253,137	25,128,735
156	South Africa	2.20	72	13,595,840	44,066,197	33,002,952
157	South Korea	1.27	106	20,845,771	47,351,083	45,224,224
158	Spain	1.28	98	28,062,963	40,016,081	35,564,293
159	Sri Lanka	1.84	79	7,533,097	19,435,869	24,920,558
160	St Kitts & Nevis	2.31	67	44,341	38,819	52,348
161	St Lucia	2.18	62	79,050	156,260	235,420
162	St Vincent	1.83	71	66,452	115,461	92,335
163	Sudan	4.72	71	8,051,151	35,079,814	84,192,309
164	Suriname	2.32	89	208,068	432,485	617,249
165	Swaziland	3.53	68	277,384	1,109,750	720,603
166	Sweden	1.66	99	7,014,005	8,923,569	9,084,788
167	Switzerland	1.43	101	4,694,000	7,266,920	7,296,092
168	Syria	3.40	83	3,495,000	16,305,659	34,437,235
169	Taiwan	1.57	105	7,981,454	22,151,237	23,203,650
170	Tajikistan	4.00	87	1,530,047	6,229,697	12,132,365
171	Tanzania	4.97	72	7,934,924	33,065,142	71,949,135
172	Thailand	1.64	91	20,041,628	61,862,928	69,268,817
173	Timor-Leste	3.53	87	435,529	846,599	1,942,734

(*continued on next page*)

Appendix (*continued*)

	Country	Fertility rates	IQ	Population 1950	Population 2000	Population 2050
174	Togo	4.96	70	1,171,897	4,711,655	14,714,623
175	Tonga	3.00	86	45,744	102,321	188,340
176	Trinidad & Tobago	1.74	85	632,000	1,118,204	622,011
177	Tunisia	1.74	83	3,517,210	9,563,816	12,462,798
178	Turkey	1.92	90	21,121,639	65,666,677	86,473,786
179	Turkmenistan	3.37	87	1,204,075	4,518,268	9,626,193
180	Uganda	6.71	73	5,521,758	23,955,822	128,007,514
181	Ukraine	1.17	97	36,774,854	49,005,222	33,573,842
182	United Arab Emirates	2.88	84	71,250	2,369,153	3,696,962
183	United Kingdom	1.66	100	50,127,000	59,522,468	63,977,435
184	United States	2.09	98	152,271,000	282,338,631	420,080,587
185	Uruguay	1.89	96	2,194,275	3,323,876	3,728,264
186	Uzbekistan	2.91	87	6,250,443	24,755,519	48,597,111
187	Vanuatu	2.70	84	52,000	189,618	310,486
188	Venezuela	2.23	84	5,009,006	23,542,649	37,106,394
189	Vietnam	1.91	94	25,348,144	79,060,410	107,772,641
190	Yemen	6.58	85	4,777,089	17,479,206	71,119,251
191	Zambia	5.39	71	2,553,000	10,205,262	18,435,053
192	Zimbabwe	3.13	66	2,853,151	11,751,323	12,221,257

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